

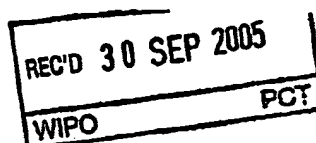
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VERSION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)



Applicant's or agent's file reference RL.P52649WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/16)	
International application No. PCT/EP2003/050098	International filing date (day/month/year) 09.04.2003	Priority date (day/month/year) 09.04.2003
International Patent Classification (IPC) or both national classification and IPC H04Q11/04, H04M3/22		
Applicant TELEFONAKTIEBOLAGET LM ERICSSON (PUBL) et al.		

1. This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 13.10.2004	Date of completion of this report 04.10.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tlx 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Gijssels, W Telephone No. +31 70 340-4126 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP2003/050098**

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-9 as originally filed

Claims, Numbers

1-11 filed with telefax on 22.09.2005

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP2003/050098**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	
Inventive step (IS)	Yes: Claims	1-11
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

2. Citations and explanations

see separate sheet

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Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Claim 1

Reference is made to the following document:

D1: WO 02/093838 A (NOKIA CORP) 21 November 2002 (2002-11-21)

The document D1 represents the **closest prior art** and discloses a method of lawful interception of a multimedia call between two or more terminals.

The subject-matter of claim 1 **differs from D1** in that it does not disclose the method step of emulating a multimedia terminal at the gateway and setting up at least one multimedia call between the emulated terminal and a monitoring terminal, the gateway performing the complete media control protocol transactions with the monitoring terminal in dependence upon the received parameters.

This has the **advantage** of avoiding specialist equipment installed at the monitoring centre.

The **problem** to be solved by the present invention may therefore be regarded as how to avoid complex and therefore expensive equipment at law enforcement agencies.

The **solution** to this problem as defined in claim 1 of the present application is considered to involve an inventive step (Article 33(3) PCT).

Thus, the requirements (Article 33(1) PCT) of **novelty** (Article 33(2) PCT), **inventive step** (Article 33(3) PCT) and **industrial applicability** (Article 33(4) PCT) are all met.

Claims 2-10

Claims 2-10 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Claim 11

Independent claim 11 defines an apparatus that corresponds to the method defined by the combination of the features of claim 1. Therefore, by the same reasoning as explained above, the requirements (Article 33(1) PCT) of **novelty** (Article 33(2) PCT), **inventive step**

INTERNATIONAL PRELIMINARY

International application No. **PCT/EP2003/050098**

EXAMINATION REPORT - SEPARATE SHEET

(Article 33(3) PCT) and industrial applicability (Article 33(4) PCT) are all met.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 03/50098

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q11/04 H04M3/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 093838 A (NOKIA CORP) 21 November 2002 (2002-11-21)	1-4,6-11
Y	page 10, line 7 -page 12, line 31 claims 1-18,23-42; figure 1	5
X,L	WO 01 91374 A (TELEFON AB LM ERICSSON) 29 November 2001 (2001-11-29) abstract page 2, line 23 -page 3, line 27 page 13, line 10 -page 16, line 18 claims 1,13; figure 1	1-4,11
	-/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"Z" document member of the same patent family

Date of the actual completion of the international search

27 February 2004

Date of mailing of the international search report

04/03/2004

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/50098

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 085041 A (T-MOBILE DEUTSCHLAND GMBH) 24 October 2002 (2002-10-24) abstract page 9, line 1-24 page 13, line 15-27 claims 1,3,5,7,11-21; figures 1,3	1-4,11
X	WO 01 47222 A (ERICSSON INC) 28 June 2001 (2001-06-28)	1,11
Y	abstract page 6, line 9-20 figure 3	5
L	WO 03 049357 A (TELEFON AB LM ERICSSON) 12 June 2003 (2003-06-12) abstract page 6, line 6 -page 8, line 7 figures 1-3	1,10,11
E	EP 1 389 862 A (ALCATEL) 18 February 2004 (2004-02-18) abstract column 7-8, paragraphs 47-51 claims 1-6; figure 2	1-4,10, 11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/50098

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 02093838	A	21-11-2002	WO	02093838 A1	21-11-2002
WO 0191374	A	29-11-2001	AU	6092601 A	03-12-2001
			EP	1299974 A1	09-04-2003
			WO	0191374 A1	29-11-2001
WO 02085041	A	24-10-2002	DE	10117998 A1	24-10-2002
			WO	02085041 A2	24-10-2002
			EP	1378108 A2	07-01-2004
WO 0147222	A	28-06-2001	AU	3265601 A	03-07-2001
			WO	0147222 A2	28-06-2001
WO 03049357	A	12-06-2003	GB	2376392 A	11-12-2002
			WO	03049357 A2	12-06-2003
EP 1389862	A	18-02-2004	EP	1389862 A1	18-02-2004

Claims

1. A method of performing lawful interception of a multimedia call between two or more terminals, the method comprising:
 - 5 detecting the initiation of said call at monitoring equipment located in the call path;
forwarding from the monitoring equipment to a gateway, parameters defining at least one of the forward and reverse channels of said call;
emulating a multimedia terminal at said gateway and setting up at least one
10 multimedia call between the emulated terminal and a monitoring terminal, the gateway performing the complete media control protocol transactions with the monitoring terminal in dependence upon the received parameters; and
following the setting up of the first mentioned multimedia call, intercepting forward and/or reverse channel data at said monitoring equipment, routing the
15 intercepted data to said gateway, and transmitting the data to the monitoring terminal over the forward channel of the or each second mentioned multimedia call.
2. A method according to claim 1, said gateway performing a mapping between protocols used in the network connecting the terminals involved in the call being
20 intercepted, to protocols used in the network connecting the gateway to the monitoring terminal.
3. A method according to claim 1 or 2, wherein the monitoring terminal communicates with said gateway via a broadband IP network.
25
4. A method according to any one of the preceding claims, said monitoring equipment forwarding to said gateway, signalling messages exchanged between the terminals involved in the call being intercepted.
- 30 5. A method according to any one of the preceding claims, said gateway performing transcoding of intercepted channel data.
6. A method according to any one of the preceding claims and comprising setting up a call from said gateway to the monitoring terminal for each of the forward and
35 reverse channels of the intercepted call.

7. A method according to any one of claims 1 to 5 and comprising multiplexing/mixing the intercepted forward and reverse channel data onto the forward channel of a single call established between said gateway and the monitoring terminal.

5

8. A method according to any one of claims 1 to 5 and comprising establishing two calls between the gateway and respective terminals at the monitoring centre, forward channel data from the intercepted call being placed on the forward channel of one of these two calls, whilst reverse channel data is placed on the forward channel of the other one of the calls.

10

9. A method according to any one of the preceding claims, wherein the terminals participating in the first mentioned multimedia call are H.324 terminals, and said monitoring terminal is an H.323 terminal.

15

10. A method according to any one of claims 1 to 8, wherein the terminals participating in the first mentioned multimedia call are SIP terminals, and said monitoring terminal is also a SIP terminal

20

11. Apparatus for intercepting a multimedia call between two or more terminals, the apparatus comprising:

means for receiving from monitoring equipment located within the call path, parameters defining at least one of the forward and reverse channels of said call, following detection of the initiation of said call by the monitoring equipment;

25

means for emulating a multimedia terminal and means for setting up at least one multimedia call between the emulated terminal and a monitoring terminal, this means performing the complete media control protocol transactions with the monitoring terminal in dependence upon the received parameters; and

30

means for receiving intercepted forward and/or reverse channel data from said monitoring equipment, and for transmitting the data to a monitoring terminal over the forward channel(s) of the second mentioned multimedia call(s).

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
21 October 2004 (21.10.2004)

PCT

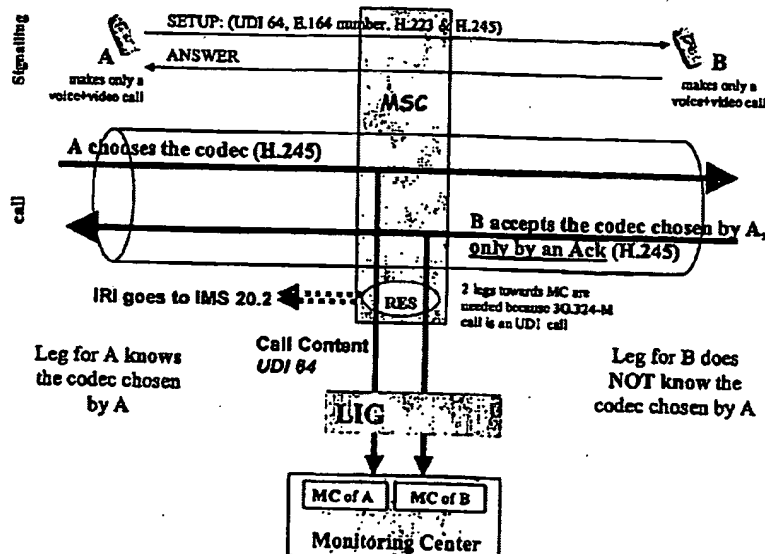
(10) International Publication Number
WO 2004/091250 A1

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- (21) International Application Number: PCT/EP2003/050098
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- (25) Filing Language: English
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- (71) Applicant (for all designated States except US): TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-164 83 Stockholm (SE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): LAIHO, Keljo [FI/FI]; Metsätorpantie 2 G 20, FIN-02430 Masala (FI). VALASSI, Paolo [IT/IT]; Ericsson Telecomunicazioni SpA, Vimodrone/TEI/HD, Via Anagnina 203, CP 4235, I-00100 Roma Appio (IT).
- (74) Agents: LIND, Robert et al.; Marks & Clerk, 4220 Nash Court, Oxford Business Park South, Oxford, Oxfordshire OX4 2RU (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

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(54) Title: LAWFUL INTERCEPTION OF MULTIMEDIA CALLS



(57) Abstract: A method of performing lawful interception of a multimedia call between two or more terminals. The method comprises detecting the initiation of said call at monitoring equipment located in the call path, and forwarding from the monitoring equipment to a gateway, parameters defining at least one of the forward and reverse channels of said call. At least one multimedia call is set up from said gateway to a monitoring terminal in dependence upon the received parameters. Following the setting up of the first mentioned multimedia call, forward and/or reverse channel data is intercepted at said monitoring equipment, the intercepted data routed to said gateway, and the data transmitted to the monitoring terminal over the forward channel of the or each second mentioned multimedia call.

WO 2004/091250 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Lawful Interception of Multimedia Calls

Field of the Invention

- 5 The present invention relates to the lawful interception of multimedia calls within a communications network.

Background to the Invention

- 10 The introduction of new communication systems including third generation mobile networks (3G) and broadband IP networks will result in a wide range of services being available to users. Not least amongst these services will be the possibility for multimedia (MM) calls between users, allowing video telephony and the exchange of data.
- 15 There are circumstances in which authorised agencies such as the police and intelligence services must be able to monitor calls including multimedia calls. Such lawful interception is required in order to be able to collect information on those suspected of involvement in criminal or terrorist activities. The lawful interception of traditional voice call has been handled in two ways:
- 20 1) The voice streams coming from the subscribers involved in a call to be intercepted are mixed together by monitoring equipment located in one of the "switches" involved in the call. The mixed stream is sent, by establishing an ancillary call, to the monitoring centre. Thus the mixed stream, i.e. the complete conversation between the parties, can be played for example using an ordinary loudspeaker in the monitoring centre.
- 25 2) The voice streams coming from the subscribers involved in the intercepted call are not mixed, but rather two connections are established from the monitoring equipment to the monitoring centre, each carrying one leg of the call. This allows the monitoring centre to record the voices of the two call parties separately and/or mix the voice streams in the monitoring centre.
- 30 The lawful interception of multimedia calls is more problematic than for voice calls. The protocols used to set up a multimedia call between terminals require handshaking between the participating terminals. The handshaking is used to agree upon parameters describing the payload of the call and how the payload is to be transported. The parameters to describe the payload include a used codec and codec options (e.g. video codecs such as H263 and MPEG4
- 35 include a number of optional features, the main purpose of which are to either improve the

picture quality or decrease the used bandwidth, or both). Transport parameters include for example payload format, e.g. the format of the RTP-packet to be used to carry a data stream in IP based transport network, or H223 logical channel parameters used in narrowband multimedia H.324. H223 logical channel parameters include parameters specifying whether payload frames
5 are allowed to be segmented into several H223 multiplex frames, whether the payload frames are numbered, etc.

Figure 1 illustrates for example a handshake between two terminals according to the ITU-T H.245 protocol (where "OLC" designates Open Logical Channel signaling messages). In the
10 lawful interception scenario, it is not possible to involve the monitoring centre in the handshaking process as two terminals are already involved in the process and in any case it is undesirable to alert a terminal associated with a call to the interception action. For multimedia calls therefore, according to current interception processes, normal multimedia equipment (e.g. mobile handsets) cannot be used in the monitoring centre to decode and display the media.
15 Interception can only be achieved using specialist equipment installed at the monitoring centre.

Summary of the Invention

According to a first aspect of the present invention there is provided a method of performing
20 lawful interception of a multimedia call between two or more terminals, the method comprising:
detecting the initiation of said call at monitoring equipment located in the call path;
forwarding from the monitoring equipment to a gateway, parameters defining at least one of the forward and reverse channels of said call;
setting up at least one multimedia call from said gateway to a monitoring terminal in
25 dependence upon the received parameters; and
following the setting up of the first mentioned multimedia call, intercepting forward and/or reverse channel data at said monitoring equipment, routing the intercepted data to said gateway, and transmitting the data to the monitoring terminal over the forward channel of the or each second mentioned multimedia call.

30 A main function of the gateway is to map, where necessary, protocols used in the network connecting the terminals involved in the call being intercepted, to protocols used in the network connecting the gateway to the monitoring terminal. These protocols include media control protocols (e.g. H.245), call control protocols (ISUP, H.225), multiplexing protocols (H.223),
35 and audio and video codec protocols.

In one embodiment of the present invention, said terminals are H.324 terminals and a multimedia call is established between these terminals via circuit switched networks. The monitoring terminal is an H.323 or SIP terminal, and communicates with said gateway via a
5 broadband IP network.

Preferably, said monitoring equipment forwards to said gateway, signalling messages exchanged between the terminals involved in the call being intercepted. The gateway uses the information contained in these messages to setup the multimedia call(s) to the monitoring
10 terminal and/or to setup transcoding functions within the gateway. The need for transcoding is determined primarily by the properties of the monitoring terminal, as well as the properties of the gateway.

The method may comprise setting up a call from said gateway to the monitoring terminal for
15 each of the forward and reverse channels of the intercepted call. Alternatively, the forward and reverse channels data may be multiplexed/mixed onto the forward channel of a single call established between said gateway and the monitoring terminal. In another alternative, two calls may be established between the gateway and respective terminals at the monitoring centre. Forward channel data from the intercepted call is placed on the forward channel of one of these
20 two calls, whilst reverse channel data is placed on the forward channel of the other one of the calls.

According to a second aspect of the present invention there is provided apparatus for intercepting a multimedia call between two or more terminals, the apparatus comprising:

25 means for receiving from monitoring equipment located within the call path, parameters defining at least one of the forward and reverse channels of said call, following detection of the initiation of said call by the monitoring equipment;

means for setting up at least one multimedia call to a monitoring terminal; and

30 means for receiving intercepted forward and/or reverse channel data from said monitoring equipment, and for transmitting the data to a monitoring terminal over the forward channel(s) of the second mentioned multimedia call(s).

Brief Description of the Drawings

35 Figure 1 illustrates handshake signalling between two H.324 terminals;

Figure 2 illustrates schematically a Video Interactive Gateway providing an interface between H.324 and H.323 domains;

Figure 3 illustrates the use a Lawful Interception Gateway to intercept two calls between H.324 terminals;

5 Figure 4 shows in detail signalling between two H.324 terminals, and between a Lawful Interception Gateway and an H.323 monitoring terminal;

Figure 5 shows signalling between two SIP terminals, and between a Lawful Interception Gateway and a SIP monitoring terminal; and

10 Figure 6 illustrates network nodes involved in lawful interception where calls are set up using SIP.

Detailed Description of a Preferred Embodiment

15 The following standards will be referred to *inter alia* in this description of a preferred embodiment of the present invention:

ITU-T H.323	<i>Packet based multimedia communications systems;</i>
ITU-T H.324	<i>Terminal for low bit-rate multimedia communication;</i>
ITU-T H.223	<i>Multiplex protocol for low bit rate multimedia communication;</i>
ITU-T H.245	<i>Control protocol for multimedia communication;</i>
20 3GPP TS 24.228	<i>Signalling flows for the IP multimedia call control based on SIP and SDP;</i>
3GPP TS 33.108	<i>Handover interface for lawful interception.</i>

25 By way of explanation, there is now provided a general outline of the various protocols used to establish and control multimedia calls, and of the protocols defining multimedia data types. There will then be provided a description of an embodiment of the invention which provides for the lawful interception of multimedia calls.

30 Multimedia calls can be divided into two categories: multimedia calls using narrowband circuit connections and multimedia calls using an IP (broadband) network.

In the case of multimedia calls transported over narrowband circuit connections, a known protocol is ITU-T H.324. H.324 uses a mechanism in which different multimedia components are multiplexed into a single data stream, which is transported over the circuit connection.
35 H.223 is used by H.324 as a multiplexing protocol, to multiplex different data streams from

different media codecs (e.g. G.723, AMR for audio, and H.263, MPEG4 for video) and the media control protocol (H.245) into a single data stream. The circuit switched call itself might typically be established using ISUP.

5 In the case of multimedia calls transported over an IP-network, known protocols in this category for establishing and controlling calls are H.323 and Session Initiation Protocol (SIP). The fundamental mechanism for these two protocols is the same. The media control protocol is transported via a TCP/IP (or SCTP/IP) connection between terminals. The media streams are transported by using separate RTP/IP connections for each media between the terminals. H.323
10 uses H.225 to set up connections between H.323 terminals.

Interworking between these two categories of multimedia calls is generally achieved by using a so-called Video Interactive Gateway (VIG) which makes possible interworking between low
15 bit-rate multimedia terminals (H.324) located in circuit switched telephony networks and terminals in IP based multimedia systems (H.323/SIP). The circuit switched networks may use the 64 kbit/s unrestricted digital bearer for the multimedia connection. Using H.223 as the multiplexing protocol, different multimedia components (audio, video and data) are multiplexed within the circuit switched bearer. These channels are de-multiplexed by the VIG onto separate RTP and TCP channels in the IP network, and *vice versa*. VIG may perform transcoding for
20 different multimedia components if necessary in order to make communication between end terminals possible.

H.245 may be used as a control protocol both in circuit switched networks and in IP networks, providing end-to-end capability exchange, signalling of command and indications, and
25 messages to open and describe the content of logical channels for different multimedia components. The VIG performs mapping of H.245 messages between a circuit switched network and an IP network, in order to adapt the different transport protocols and to enable transcoding of media channels. The VIG will perform mapping if necessary between the call control protocol in the circuit switched network (ISUP), and that in the IP network (H.225).
30

Figure 2 illustrates schematically a VIG interfacing H.324 and H.323 networks. The VIG comprises a Media Gateway operating at the bearer level and providing interworking between user data, and a Media Gateway Controller operating at the call control level and providing interworking between signalling protocols.

It must be possible to carry out the lawful interception of calls between terminals regardless of the protocols used between the terminals. However, this should be possible using some standard piece of equipment on the part of the intercepting authority, i.e. it is not desirable to have to select equipment depending upon the protocols used between callers and upon whether or not a VIG is present in a call path.

Figure 3 shows an example lawful interception scenario for a call between two mobile terminals (A and B) having narrowband access (e.g. via a 3G network), both terminals being H.324 terminals. Monitoring equipment (this essentially being equipment for placing a "tap" on both legs of a call) is located within an MSC of the GSM network. A Lawful Interception Gateway (LIG) provides a gateway between the monitoring equipment and a monitoring centre. The monitoring centre comprises an H.323 terminal coupled to the LIG via a broadband IP network. In a typical scenario, the H.323 terminal at the monitoring centre is implemented on a standard Personal Computer (PC). Whilst the PC might use, for example, Microsoft Netmeeting™ to establish calls with the LIG, the LIG would typically use a proprietary solution for this purpose.

The LIG acts as a VIG (see Figure 2), translating data between the narrowband and broadband formats. The functions performed by the LIG are as follows:

- The LIG listens to the incoming data streams from the monitoring equipment.
- It decodes the transport/multiplex protocols (e.g. H.223)
- The LIG decodes the relevant information from the media control protocol, i.e. codec information within the Session Description Protocol (SDP) in case where SIP is used in the broadband network, and codec information and other information (e.g. H.223 logical channel parameters within H.245 in case of H.323).
- The LIG establishes a connection to a normal multimedia terminal in the monitoring centre based on the received information.
- The LIG emulates a normal multimedia terminal towards the normal multimedia terminal within the monitoring centre, by performing the complete media control protocol transactions with that terminal. This includes: 1) invoking the required procedures to connect the media streams for the data coming from the monitoring equipment, and 2) responding correctly to the procedure invocations coming from the terminal in the monitoring centre.
- The LIG forwards the media streams coming from the monitoring equipment, over the established connections to the monitoring centre.

Figure 4 illustrates signalling exchanges between the H.324 terminals A and B. In order to set up a call between the two terminals, a terminal capabilities exchange procedure (or handshake) is performed. The results of this negotiation are confirmed by terminal A to terminal B in an OLC (Forward Channel Description, Reverse Channel Description) message. The MSC in which the monitoring equipment is located maintains or has access to a database of subscribers for whom lawful interception warrants have been served. When a MM call is initiated to or from a subscriber on whom such an order has been placed, the MSC notifies the LIG. The MSC then forwards to the LIG the entire (64kbit/s) multiplexed streams, in both the forward and reverse directions, including the OLC (Forward Channel Description, Reverse Channel Description) message sent from terminal A to terminal B.

The LIG examines the parameters of the two legs of the call, and initiates two calls to the H.323 terminal at the monitoring centre. The properties of the forward channel (i.e. which will carry data from the LIG to the monitoring centre) of the first call correspond to the properties of the forward channel of the call between terminals A and B. The properties of the forward channel of the second call correspond to the properties of the reverse channel of the call between terminals A and B. The properties of the reverse channels of the two calls between the LIG and the H.323 terminal are irrelevant as these channels will not be used to carry "live" data.

An assumption here is that the H.323 terminal at the monitoring centre is able to terminate two calls simultaneously, and therefore that the forward and reverse channels of the intercepted call can be carried on respective calls to that H.323 terminal. An alternative mechanism is for the LIG to establish calls to two different H.323 terminals at the monitoring centre, or for a single call to be established with the forward and reverse channel data being multiplexed/mixed onto that single call. An appropriate mechanism may be selected by the LIG based upon a terminal capabilities negotiation with the H.323 terminal.

The LIG may include transcoding capabilities, which makes it possible to use multimedia terminals in the monitoring centre which do not support all possible codecs.

Figure 5 illustrates signaling in a scenario where the terminal used at the monitoring centre utilises SIP signaling to establish calls over a broadband IP network to which the LIG is also attached, and in which the two terminal participating in the intercepted call also use SIP signaling. Again, following notification of (forward and reverse channel) parameters by the monitoring equipment at the MSC, the LIG establishes two calls to the SIP terminal at the

monitoring centre. It will be appreciated that in this embodiment of the invention the LIG does not provide any VIG functionality.

Figure 6 illustrates in more detail the interception procedure. Within the IP multimedia subsystem (IMS), a Proxy CSCF (P-CSCF) participates in SIP signalling. The P-CSCF may be located either in a participating terminal's home network or in a visited network to which that terminal is attached. The P-CSCF identifies the SIP-URL(s) to which SIP signalling belongs. The P-CSCF also has a knowledge of SIP-URLs for which calls are to be intercepted. Using this information, the P-CSCF forwards SIP signalling associated with a call to be intercepted to the LIG as shown in Figure 5 (the LIG is implemented as part of the Delivery Function (DF)). The P-CSCF commands the GPRS Gateway Support Node (GGSN) to make a copy of RTP-stream (media streams) and forward them it to the LIG. In Figure 6, the monitoring terminal corresponds to the LEMF node, the latter being 3GPP terminology. According to 3GPP, the H3 and H2 interfaces carry user and signalling data respectively from the interception node to the monitoring terminal. According to the present invention, these interfaces are "merged" into one or more multimedia calls.

It will be appreciated by the person of skill in the art that various modifications may be made to the above described embodiment. For example, the LI subscriber database available to the MSC may define for subscribers on whom an interception warrant has been place, whether the reverse and forward channels are to be intercepted, or whether only one of these channels is to be intercepted. This information is signaled to the LIG.

Whilst in the scenario described with reference to Figure 3 the terminals A and B are H.324 terminals whilst the intercepting terminal is an H.323 terminal, other scenarios are possible. These include:

1. A and B terminals are H.324 terminals. The monitoring centre has an H323 terminal. The LIG performs H245-H245 mapping between two half calls and two complete calls. The LIG also performs TDM/H223 to IP/RTP interworking.
2. A and B terminals are H324 terminals. The monitoring centre has an H324 terminal. The LIG performs H245-H245 mapping between two half calls and two complete calls.

3. A and B terminals are H324 terminals. The monitoring centre has a SIP terminal. The
LIG performs H245-SIP mapping between two half calls and two complete calls. The
LIG also performs TDM/H223 to IP/RTP interworking.
4. A and B terminals are SIP terminals. The monitoring centre has an H323 terminal. The
LIG performs SIP-H245 mapping between two half calls and two complete calls.
5. A and B terminals are SIP terminals. The monitoring centre has an H324
terminal. The LIG performs SIP-H245 mapping between two half calls and two
complete calls. The LIG also performs TDM/H223 to IP/RTP interworking.
6. A and B terminals are SIP terminals. The monitoring centre has a SIP terminal.
The LIG performs SIP-SIP mapping between two half calls and two complete
calls.

In the SIP embodiment of Figure 5, it might sometimes be the case that intercepted data does
not need conversion/transcoding at the LI gateway. In that case, the P-CSCF might instruct the
GGSN to forward intercepted data directly to the monitoring terminal. No multimedia call need
be established between the LI gateway and the monitoring terminal.

Claims

1. A method of performing lawful interception of a multimedia call between two or more terminals, the method comprising:
 - 5 detecting the initiation of said call at monitoring equipment located in the call path;
 - forwarding from the monitoring equipment to a gateway, parameters defining at least one of the forward and reverse channels of said call;
 - setting up at least one multimedia call from said gateway to a monitoring terminal in dependence upon the received parameters; and
 - 10 following the setting up of the first mentioned multimedia call, intercepting forward and/or reverse channel data at said monitoring equipment, routing the intercepted data to said gateway, and transmitting the data to the monitoring terminal over the forward channel of the or each second mentioned multimedia call.
- 15 2. A method according to claim 1, said gateway performing a mapping between protocols used in the network connecting the terminals involved in the call being intercepted, to protocols used in the network connecting the gateway to the monitoring terminal.
- 20 3. A method according to claim 1 or 2, wherein the monitoring terminal communicates with said gateway via a broadband IP network.
- 25 4. A method according to any one of the preceding claims, said monitoring equipment forwarding to said gateway, signalling messages exchanged between the terminals involved in the call being intercepted.
5. A method according to any one of the preceding claims, said gateway performing transcoding of intercepted channel data.
- 30 6. A method according to any one of the preceding claims and comprising setting up a call from said gateway to the monitoring terminal for each of the forward and reverse channels of the intercepted call.
- 35 7. A method according to any one of claims 1 to 5 and comprising multiplexing/mixing the intercepted forward and reverse channel data onto the forward channel of a single call established between said gateway and the monitoring terminal.

8. A method according to any one of claims 1 to 5 and comprising establishing two calls between the gateway and respective terminals at the monitoring centre, forward channel data from the intercepted call being placed on the forward channel of one of these two calls, whilst
5 reverse channel data is placed on the forward channel of the other one of the calls.

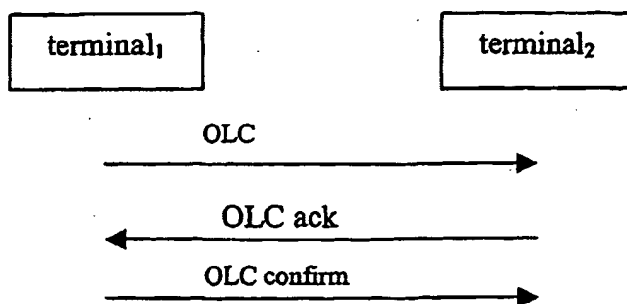
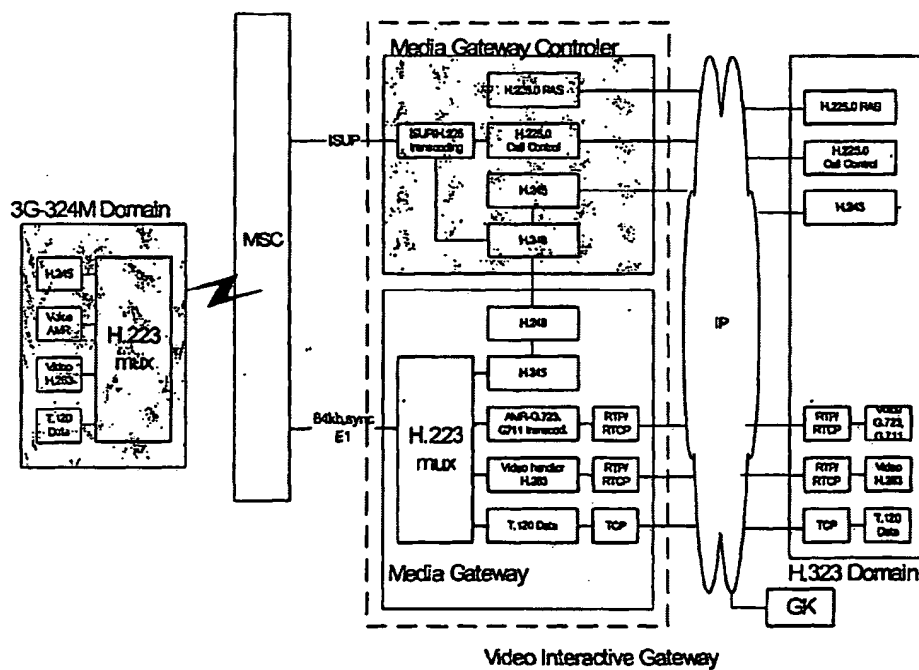
9. A method according to any one of the preceding claims, wherein the terminals participating in the first mentioned multimedia call are H.324 terminals, and said monitoring terminal is an H.323 terminal.

10. A method according to any one of claims 1 to 8, wherein the terminals participating in the first mentioned multimedia call are SIP terminals, and said monitoring terminal is also a SIP terminal

11. Apparatus for intercepting a multimedia call between two or more terminals, the apparatus comprising:

means for receiving from monitoring equipment located within the call path, parameters defining at least one of the forward and reverse channels of said call, following detection of the initiation of said call by the monitoring equipment;

means for setting up at least one multimedia call to a monitoring terminal; and
means for receiving intercepted forward and/or reverse channel data from said monitoring equipment, and for transmitting the data to a monitoring terminal over the forward channel(s) of the second mentioned multimedia call(s).

Figure 1Figure 2

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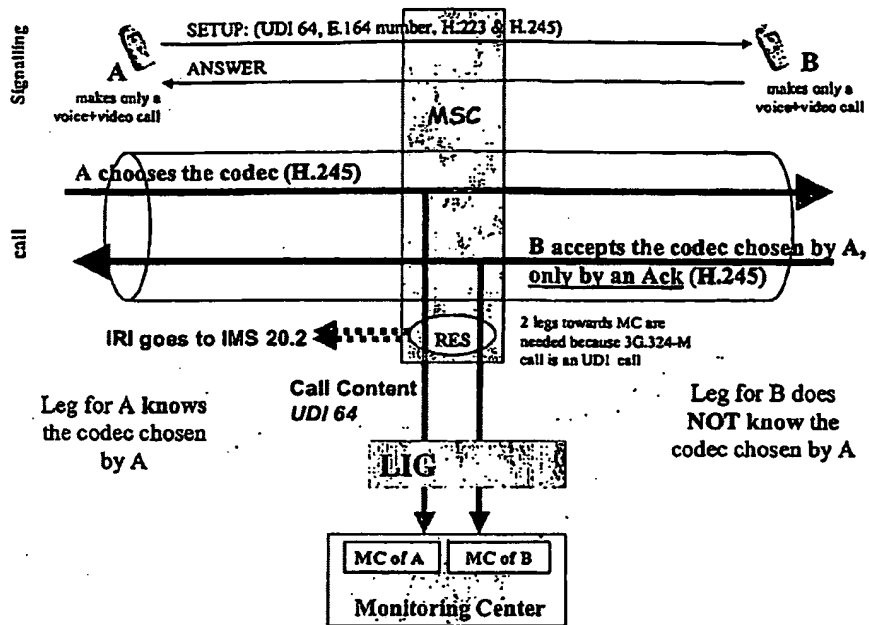


Figure 3

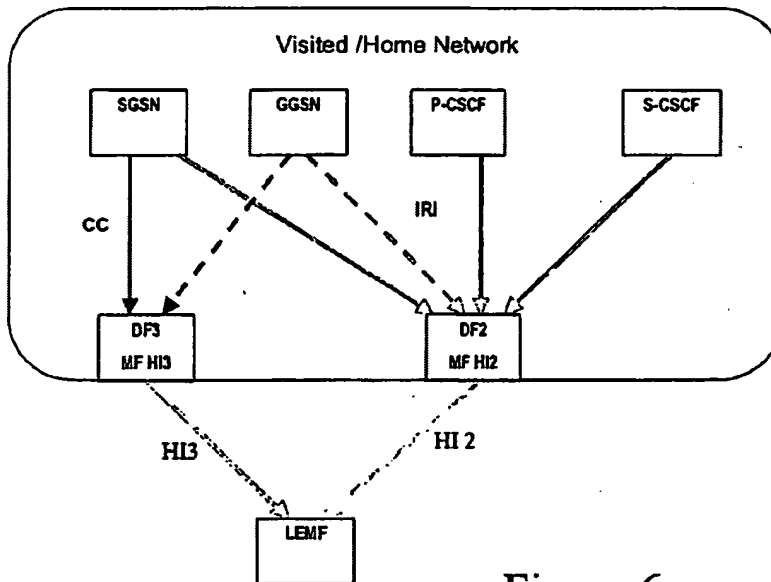
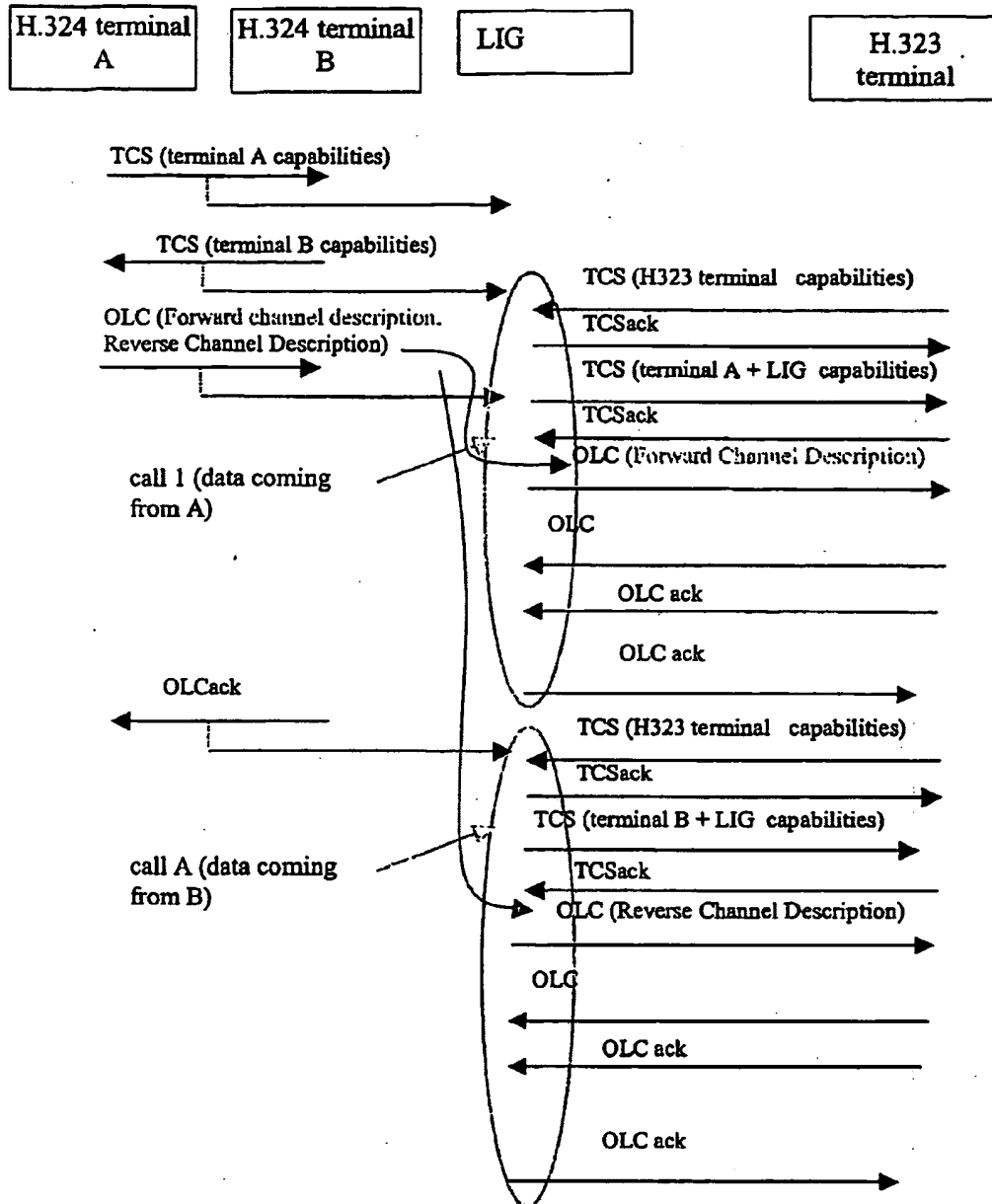
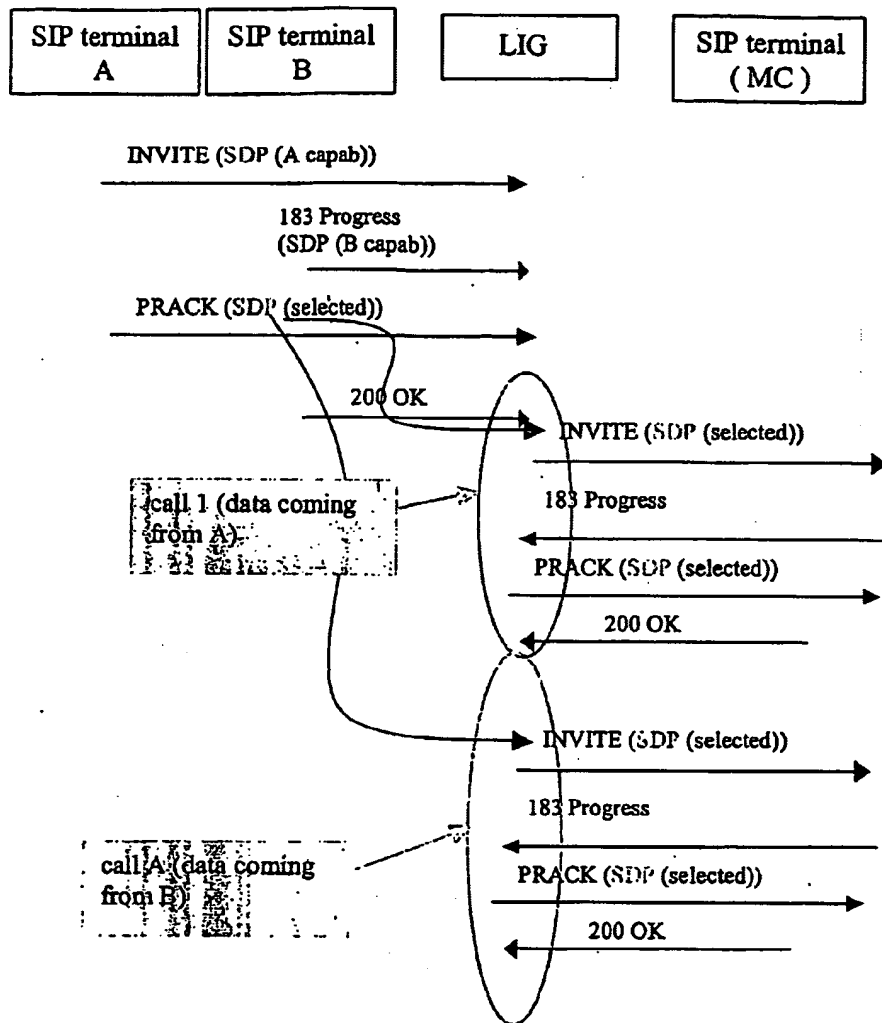


Figure 6

Figure 4

Figure 5